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DELAWARE'S BLUE CRAB

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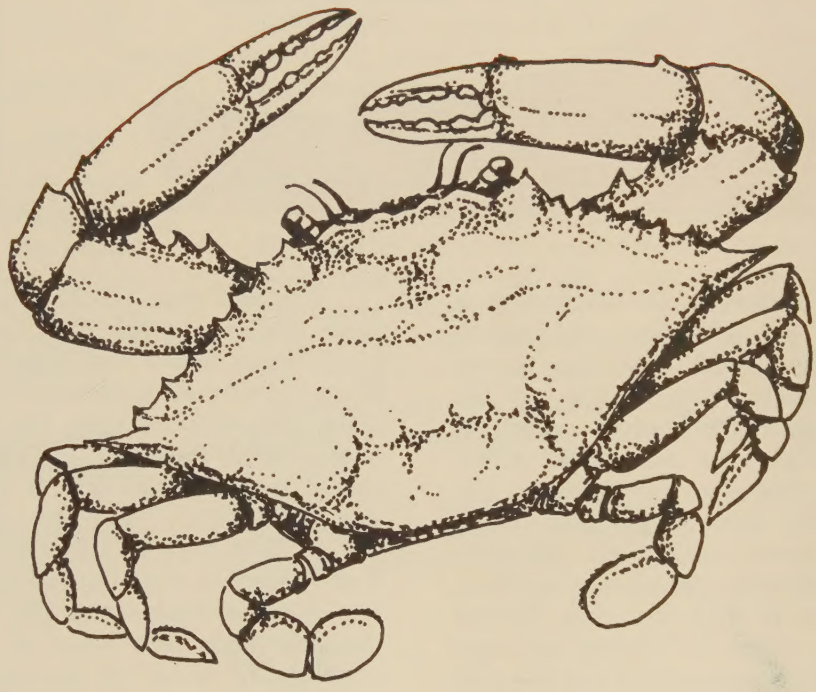


Delaware waters offer many types of fishing but probably the one animal that gets the most attention is the blue crab. Whether on a yacht or dingy, a pier or mud bank the sight of a string tied to a chicken neck or fish head is a common one in the coastal zone. Crabbing has universal appeal and the blue crab does not discriminate as to sex, age, or color as many have discovered when they inched a hand or foot within a claw's reach.

Many people associate the blue crab with only the Delaware and Chesapeake estuaries; however, the fishery exists from New Jersey to Florida and a subspecies is fished in the Gulf of Mexico. Blue crabs range north to Nova Scotia and south to Uruguay. Occasional specimens are found along the European coast from France to Denmark; and the Mediterranean Sea has a sizeable population.

What is a Blue Crab?

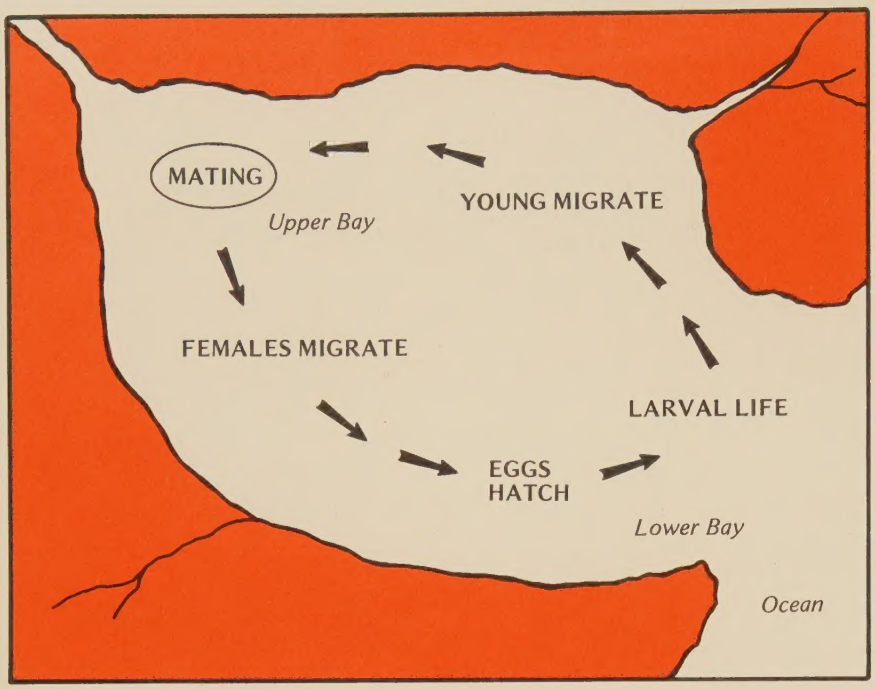
Blue crabs are invertebrates belonging to the largest group or phylum of animals called the Arthropoda, or joint-legged animals. More specifically they are decapod crustaceans, meaning that they are arthropods having ten legs and a hard shell. Scientists know the blue crab as *Callinectes sapidus* which is quite descriptive since *Callinectes* means beautiful swimmer and *sapidus*, savory.

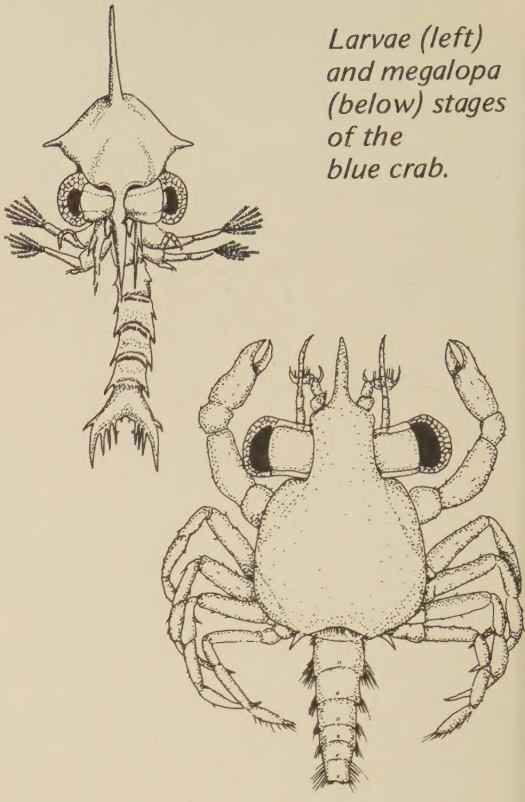
Life History and Biology

Mating. The blue crabs of Delaware's estuaries mate in brackish waters (less than 2 parts per thousand [o/oo]) between May and October, reaching a peak in late summer. Ordinarily females mate only once, while they are in the soft shell state following the last molt. Males may mate any time during the last three or four molts. Just before the last, or terminal molt the female secretes a pheromone (sex attractant) that attracts and calms the pugnacious male blue claw. The two crabs then assume the doubler position (male carrying female) and may stay this way for two-three days both before and after mating, which lasts 5-12 hours. Females are about one and one-half years old at this time and will store the sperm for use in two or more spawnings over the course of their three-year life. Males live longer than females and go through additional molts. Adult males can be distinguished by the blue claw, whereas females have red-tipped claws.

After mating, the female instinctively migrates down the tributaries and bays seeking water of higher salinity. Two to nine months

LIFE CYCLE OF A BLUE CRAB





Larvae (left) and megalopa (below) stages of the blue crab.

later (depending on whether it is spring or fall) she will attach 700,000 - 2,000,000 eggs to the swimmerets on the underside of her abdomen. Only one out of 1,000,000 eggs will reach adulthood. The eggs are orange, but gradually turn yellow and finally dark brown during the two-week incubation period. Salinity is critical, because if it is less than 23o/oo (ocean water is 32o/oo) the eggs will hatch prematurely and the zoea (larvae) will not survive. Once hatched, the zoea become part of the oceanic plankton and drift about for 40 days or more, growing and molting through the megalopa stage to the first crab stage.

Molting. The young crab is only 2 mm wide (.1 in), but grows rapidly during the summer, molting every three to five days and increasing up to one-third its size with each molt. As it becomes larger the time between molts increases. At 10 cm (4 in) the crab molts every 20 to 50 days depending upon food availability and temperature. At cooler temperatures, molting is less frequent. Molting usually does not occur from November until the first two weeks in April.

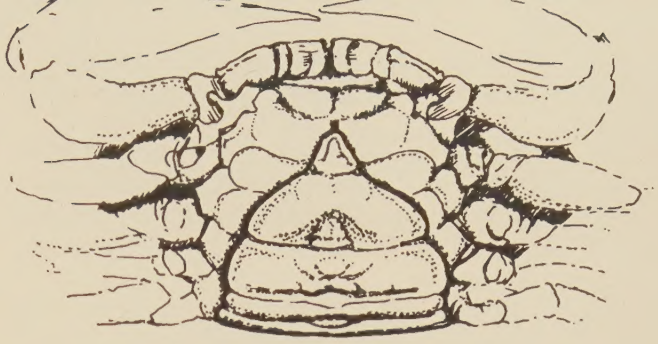
Females molt 18-20 times to reach their terminal molt, males 21-23 times, hence their larger size. When molting starts, the shell cracks along the back between the carapace and the abdomen. The crab or *buster* slowly backs out in a soft shell condition. The time varies, but a 10-14 cm (4-5 in) crab takes 2 or 3 hours to molt. During the last few minutes before and just after the molt, the crab takes in large amounts of water to expand the new shell. Over the next 9-12 hours, the shell has a papery or leathery feel giving it the name *paper shell.* The *buckram* condition follows during the next 12-24 hours as the crab becomes stiff and brittle. (The terms *buckram* and *paper shell* are often used interchangeably, and usage may depend on the locality.)

After about 72 hours the shell is hard, but the crab contains relatively little meat and is referred to as a *water gall.* As the days pass the meat content increases, the shell fills with meat, and a new "soft" shell starts forming beneath the hard outer shell. The new shell can best be seen on the last two segments of the fifth or paddle leg where it appears as a faint line or *hair sign* just inside the outer brown edge of the hard shell. This is the *white sign* and to the watermen it means one or two weeks before molting. The *white sign* crab becomes the *pink sign* crab three to six days before molting, and the *peeler* or *red sign* crab one to three days before molting. *Peelers* stop feeding a day or two before molting and are *rank* or weak because of the muscles releasing from the old shell as the crab gets ready to bust.

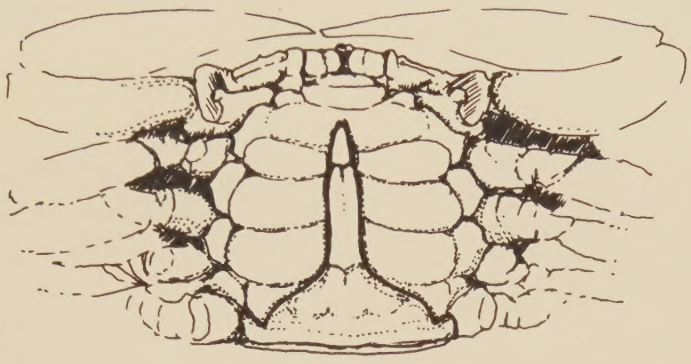
In the fall, the water cools and the crabs migrate to deeper water seeking out the bay channels. They bury there in the mud at a 45° angle with only the tips of their antennae and eye stalks exposed, and remain this way for the winter. With the warming of the water in the spring, usually in April, the crabs come out of their winter beds to begin the cycle again.

Size. Some crab biologists believe that the size of a crab may be directly influenced by water salinity, with 15o/oo being the optimum for overall growth. Therefore, crabs from fresher waters would tend to be larger, but contain more water and less solid meat; crabs from saltier waters would tend to be somewhat smaller, but have more

Immature female
"she-crab"



Mature female
"sook"



Male
"jimmy"

Crab drawings adapted from Beautiful Swimmers, William W. Warner, Little, Brown and Co., Boston.

solid meat. Any crab over six inches is considered large, by both commercial and recreational crabbers.

Food. Blue crabs have a varied diet but are most often thought of as scavengers that feed on a variety of dead animals. Decaying animals produce odors that the crab detects and locates with its extremely sensitive antennae. Actually, crabs prefer live or fresh food over decaying matter. At night blue crabs can be seen swimming around lighted piers preying upon bait fishes and smaller blue crabs. Crabs will also lie motionless on the bottom waiting for an unsuspecting by-passer. Clam, oyster and mussel beds often serve as feeding areas for blue crabs. In fact, some biologists have estimated that an adult blue crab may eat over 1,200 juvenile clams a day.

Vegetation such as saltmarsh cordgrass (*Spartina*), eelgrass (*Zostera*), sea lettuce (*Ulva*), and a number of other plants are also part of the blue crab's diet.

Commercial Fishery

The blue crab is Delaware's most valuable fishery with an average commercial catch of 50,000 bushels of hard shells and peelers per year. Commercial catches have increased in the last few years, most likely due to the increased number of fishermen.

Two methods are most commonly employed in commercial crabbing: potting and dredging. Potting accounts for the majority of the catch and commercial licenses are issued based on the number of pots used. The largest concentration of pots in Delaware is found from Bowers to Augustine Beach. Dredging is a winter fishery starting December 15 and continuing to March 30. The crabs winter in beds from Bigstone Beach to Breakwater Harbor in depths over 30 feet. Dredges are pulled through the beds catching the wintering crabs. The vast majority are females and usually are sold to the picking houses.

Crabs are sold according to size and/or sex. Large male crabs usually 6 inches or more are called *No. 1 Jimmies,* and command a premium price. *No. 2 Jimmies* are males 5 inches or more. Sooks or mature females are sometimes mixed with the No.2's and often No. 2's and sooks go for the same price. However, price and size limits vary depending on supply and demand.

Commercial picking houses expect a 10-15% yield of meat from a crab. In the Delmarva area, the other 85-90% (shell, viscera, and unpicked meat) is ground up and used as an additive in chicken feed. Sea Grant scientists at the University of Delaware and other institutions across the country are researching different ways to use this shell waste. The shell contains a cellulose-like substance called chitin (kite'n) that has shown potential for industrial use. Possible uses for chitin include biodegradable films for packaging, sausage casing, surgical sutures, and nicotine-free "filler" for tobacco.

Recreational Crabbing

What makes crabbing such a popular sport fishery? Three reasons: 1) crabbing areas are usually easily accessible; 2) expensive gear or years of experience are not required for successful crabbing; 3) the possible reward of an evening's meal is always present.

Crabbing is allowed in any of Delaware's coastal waters unless otherwise posted by the State De-

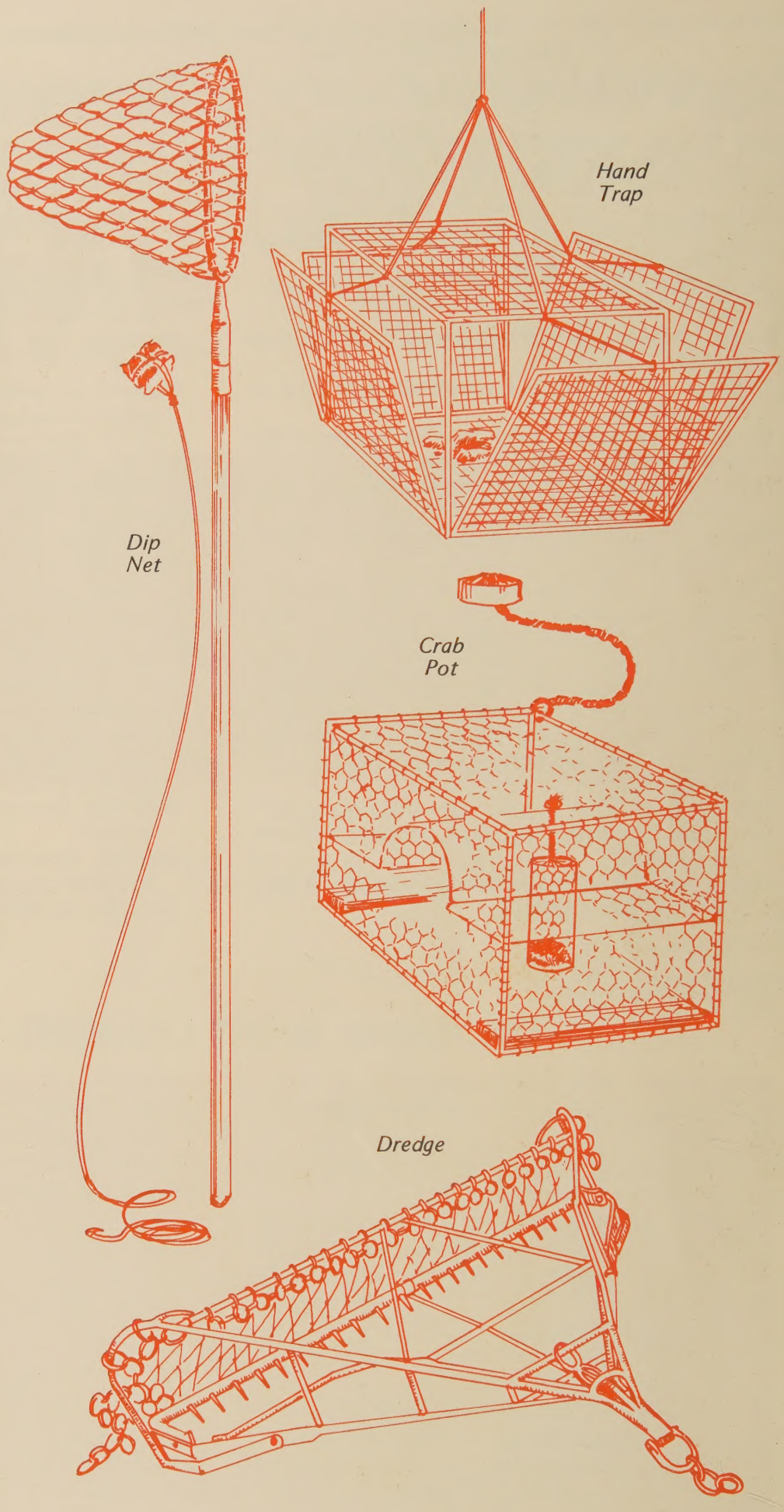
partment of Natural Resources and Environmental Control. Gear for the *hand line* method consists of line, weight and bait. Baits vary, but oily fishes such as bluefish, menhaden or herring are superior to less oily fish such as weakfish or flounder. Chicken is often used because chicken parts such as necks and backs are convenient to use and inexpensive to purchase. A long handled dip net is also needed. Some crabbers use twine nets, but many prefer a net made of chicken wire because the crab cannot become entangled. This crabbing technique is simple. The baited line is allowed to sink to the bottom and then periodically felt to see if a crab is pulling (feeding) on the other end. If the line feels as though there is a crab on it, the string is slowly raised until the crab is visible. The crab is then netted by sweeping the dip net under the crab, bait, and weight, catching all three in the net.

A bushel basket with a lid makes an excellent container for holding crabs. Crabs should never be placed in a closed container with water because they will die from lack of oxygen. If possible, keep a wet burlap bag over the crabs and keep them out of direct sunlight.

Another method of crabbing is *dipping,* and for this only a dip net is needed. Crabs swimming around lighted piers, attracted by the lights and/or the bait fishes, can be netted by agile fishermen.

The *hand trap* method consists of simply lowering a trap to the bottom and periodically raising it to check for crabs. The traps are collapsible and have an advantage over handling in that the dip net is not used, so the chance for error is eliminated. Hand traps are particularly useful when crabbing from a bridge or in deep water, where a net is not practical or the crab could drop off the line on the way up.

One other method of crabbing involves the crab pot, essentially a small fish weir (trap). Its advantage is that it does not have to be tended continuously but rather checked once or twice a day to replace the bait and take out the trapped crabs.



GLOSSARY OF THE WATERMAN'S CRABBING TERMS

Apron: the crab abdomen which is folded under the body

Bare Potting: an unbaited pot is placed in a barren area and the crab goes in seeking a place to hide

Buck and rider: a pair of mating crabs; doubler

Buckram crab: a crab past the paper shell stage but not in the true hard shell condition; approximately 12-24 hours after the shed

Buffalo crab: soft crab with the claws missing; doorknob

Buster: molting crab that is beginning to emerge from its shell

Carapace: the top part of the shell that is removed to clean the crab

Channeler or chandler: large male that remains in the deeper channels of the bay or river

Dead Man's Fingers: the gills, located under the carapace or top shell

Doorknob: soft crab with the claws missing; buffalo crab

Doubler: male carrying female crab; buck and rider

Fat crab, green crab or snot crab: terms used by waterman referring to a crab approaching the molting period and showing a white-rim color sign just within the margins of two outer segments of the swimming legs; the terms are also used to describe any crab, between the buckram and peeler phases, with firm meat

Green crab: white-rim crab; sometimes the raw (uncooked) crab

Hair sign (rim) crab: an early stage white-sign peeler

Hard crab: crab with a hard shell; following the buckram condition

Jimmy crab, jimmy dick, or jimmy channeler: a very large male crab; channeler

Jimmy crabbing: male crab is tethered swimming on a string to catch a female

Jimmy potting: seasonal method for catching female crabs that did not reach terminal molt the year before — 2 or 3 Jimmies are placed in a pot to attract females; used during the last two weeks in May; no bait is used

Lick: term used to describe dredging for crabs; a dredge is drawn across the bottom to catch wintering crabs or summer soft shells

Megalopa: final larval stage, between zoea and crab stage

Mustard: the yellow substance found in a cooked crab under the carapace; it has a strong taste and is part of the digestive system of the crab

Nicking or breaking a crab: to break the movable finger of the claws to prevent their use

Paper shell: a crab past the soft shell stage but not yet a buckram; approximatley 9-12 hours after the molt

Peeler crab: hard carb that has a fully formed soft shell beneath; a red sign crab

Pink sign (rim) crab: following the white sign condition; a thin pink line along the inner border of the back fin (paddle) about one week before molt; seconds

Rank or rank peeler: red sign peeler approximately two hours before busting

Red sign (rim) crab: following the pink sign stage; a thin red line along the inner border of the back fin (paddle) about two days before molt

Sally crab: immature female, the apron is still attached; she-crab

Seconds: crabs that have just turned from a white sign to a pink sign; pink sign crabs

She-crab: immature female

DELAWARE SPORT CRABBING FACTS

1. Legal size crabs are 5" or better; soft shells 3-1/2", peelers 3".
2. It is **lawful** to take non-egg bearing female crabs of legal size.
3. It is **unlawful** to scrub off eggs from any female crab or have such a crab in possession. This also includes a female from which the apron has been removed.
4. **Legal** sport methods are:
   a. Hand lines
   b. Dip nets
   c. Collapsible hand trap and the crab pot
5. Sport crabbers may **not** use more than two pots at a time; more than two pots in use is considered commercial crabbing and a license is required.
6. Pots should also be marked with white buoys with the letters N.C. followed by a dash and the owner's initials.
7. It is **unlawful** to sell crabs without a commercial crabbing license.
8. It is **legal** to crab at night with a light.
9. Commercial crabbing is not permitted in Indian River, Rehoboth and Assawoman Bays.

For specific details a booklet entitled: "Delaware Shellfish Laws and Regulations" is available from:

Division of Fish and Wildlife
Edward Tatnall Bldg.
Dover, DE 19901

Shed: either the empty shell or the process of casting off the shell

Snot crab: white sign crab, so named because of the watery substance, which issues from the "nicking" of claws

Soft crab: crab that has just shed its old shell and now has a soft pliable shell before hardening; sometimes graded and sold as follows: mediums 3"-3.5"; hotels 3.5"-4"; primes 4"-4.5"; whales or slabs 5" or more

Sook: a mature female

Sponge crab: female crab carrying an egg mass; berried crab; busted sook; cushion crab; lemon bellie; lemon crab; orange crab; punk; ballie

Terminal molt: the final molt, usually associated with the female because at this time, mating takes place while in the soft shell state

"Ticky" crab: one that smells of iodoform, probably because of eating a marine bottom animal called **Balanoglossus**

Water gall, white crab, windjammer: crab that is almost in the hard shell condition or just hard and is very light in color and weight

White sign (rim) crab: the fat, green, or snot crab condition; a thin white line along the inner border of the back fin (paddle) about two weeks before molt

Zoea: the larva that hatches from the egg and continues till the megalopa stage

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